AQA

**General Certificate of Secondary Education
November 2012**

Mathematics   **43601H**

Unit 1 Higher tier

FINAL

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from: aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
Q	Marks awarded for Quality of Written Communication
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
3.14 …	Allow answers which begin 3.14 eg 3.14, 3.142, 3.149.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Unit 1 Higher Tier

Q	Answer	Mark	Comments
1a	Lists at least 4 correct combinations from (SC), SB, SP CJ, CF, BJ, BF, PJ, PF	M1	$1 \times 3 + 3 \times 2$ or $3 + 6$ oe
	9 or 8 (more)	A1	
1b	$\dfrac{3}{9}$	B1 ft	oe ft their 3 and their 9 if probability > 0 and < 1
1c	$270 \times$ their $\dfrac{3}{9}$	M1	oe
	90	A1 ft	ft their part (b) but must be > 0 and < 1 Must give integer answer

Q	Answer	Mark	Comments
2	$\dfrac{1}{4} \times 100$ (= 25 (green))	M1	oe
	their 25×2 (= 50 (blue))	M1	oe
	their $50 \div 5$ (= 10 (red))	M1	oe
	15	A1	
	Alternative method		
	blue = $\dfrac{1}{2}$	M1	oe
	red = $\dfrac{1}{10}$	M1	oe
	$1 - (\dfrac{1}{4} + \dfrac{1}{2} + \dfrac{1}{10})$ $(= \dfrac{3}{20})$	M1	oe
	15	A1	

Q	Answer	Mark	Comments
3a	Suitable key	B1	
	2 4 8 1 2 5 6 9 9 0 2 4 6	B2	B1 complete but unordered leaves or B1 one correct row (only award for first row if single digit values used throughout)
3b	$26 - 25$ or $2 + 25$	M1	oe
	1, 27	A1	either answer implies M1 SC1 Range (for 13 days) = 24 seen or $26 - 2 = 24$ seen

Q	Answer	Mark	Comments
4a	$200 < t \le 240$	B1	
4b	$16 \times 220 \ (= 3520)$ or $4 \times 260 \ (= 1040)$ or $4 \times 300 \ (= 1200)$ or $2 \times 380 \ (= 760)$ or $2 \times 460 \ (= 920)$ or $2 \times 500 \ (= 1000)$ or 8440	M1	Attempt at fx using one correct midpoint
	(their 3520 + their 1040 + their 1200 + their 0 + their 760 + their 0 + their 920 + their 1000) ÷ 30	M1 dep	1055 implies M1M0A0 7473.(…) implies M1M1A0
	281 or 282 or 281.3(…)	A1	SC2 301.(3..) or 261.(3..)
4c	Ticks modal class and gives valid reason eg Current performance in this class or This class has shorter times	B1	oe the mean is affected by a few (older) slower times or older / slower times irrelevant to current performance

Q	Answer	Mark	Comments
5a	$1430 - 1250 \ (= 180)$	M1	$\frac{1430}{1250} \ (\times 100)$
	$\frac{their\ 180}{1250} \times 100$ or 0.144	M1 dep	oe 1.144 or 114.4
	14.4	A1	
5b	At least 3 non-overlapping, exhaustive boxes with units	B2	B1 at least 3 non-overlapping, exhaustive boxes without units B1 at least 3 with gaps but no overlaps or B1 at least 3 with overlaps but no gaps or B1 2 exhaustive and non-overlapping

Q	Answer	Mark	Comments
6a	$\frac{28}{40}$ or 70% or 0.7	B1	oe
6b	their $\frac{28}{40}$ × 10 (= 7) or $\frac{9}{40}$ × 10 (= 2.25 or 2) or $\frac{3}{40}$ × 10 (= 0.75 or 1)	M1	ft their $\frac{28}{40}$ from part (a) × 10 for red oe 28 ÷ 4 or 9 ÷ 4 or 3 ÷ 4
	7 and 2 and 1	A1	Must give integer answers

Q	Answer	Mark	Comments
7a	Cumulative frequencies correct in table 2, 10, 44, 54, 60	M1	Allow one addition error in cumulative frequencies but must be increasing May be implied by graph ($\pm \frac{1}{2}$ sq)
	Smooth curve or polygon through **all** points at correct heights	A1	Must be an increasing function but not a single straight line Ignore below their 95
	5 points at increasing heights, plotted at upper class bounds ($\pm \frac{1}{2}$ sq) 95, 100, 105, 110, 115	Q1	Strand (ii) – logical organised working Allow one missing upper class bound
7b	The correct integer value for 109 from their graph eg 52 or **correct** interpolation from table ie (44 + 0.8 × 10 =) 52	B1 ft	ft an increasing function but not a single straight line
	Number of boys = 45	B1	Accept 45.75 from $\frac{3}{4}$ (60 + 1)
	their 52 + their 45	M1	The correct value ±2 for 109 from their increasing graph (not a straight line) or from correct interpolation method Their 45 in range [45, 50]
	97	A1 ft	ft their 52 + their 45

Q	Answer	Mark	Comments
8	All correct ie each head $= \dfrac{2}{5}$ and each tail $= \dfrac{3}{5}$	B3	oe B2 all pairs of probabilities add to 1 and at least one pair correct B1 two correct probabilities in correct positions
9	10p and 9p, p an integer >1 and 5q and 4q, q an integer >1	M1	eg 20, 18 and 10, 8
	10p and 9p and 5q and 4q, p, q integers >1 **and** 9p = 5q **or** 25r : 18r	M1	eg 100, 90 and 90, 72
	25 : 18	A1	
10	$\left(\dfrac{1}{2}\right)^{5} \div (7.15 \times 10^{-8})$ or $\dfrac{1}{32}$ oe seen	M1	oe Condone bracket error in (7.15×10^{-8}) Condone use of $\dfrac{2}{5}$ for $\dfrac{1}{2}$ or $\dfrac{32}{3125}$ oe seen (following Q8)
	$= 437062.(\ldots)$	A1	May be implied
	4.4×10^{5}	Q1ft	Strand (i) Correct notation required ft any decimal (at least 3 sf) rounded to 2 sf and written in correct standard form $4.37 \ldots \times 10^{5}$ scores M1A1Q0 440 000 scores M1A1Q0

Q	Answer	Mark	Comments
11a	median = 1000 ÷ 2 = 500	M1	Accept 500.5
	20 × 9 (= 180) or 10 × 40 (= 400) or 10 × 34 (= 340) **and** 20 × 4 (= 80)	M1	
	$\dfrac{500 - \text{their }180}{\text{their }400} \times 10 \ (= 8)$ or $\dfrac{\text{their }400 + \text{their }180 - 500}{\text{their }400} \times 10 \ (= 2)$	M1dep	oe $\dfrac{320}{400} \times 10\ (= 8)$ or $\dfrac{4}{5} \times 10\ (= 8)$ or $\dfrac{80}{400} \times 10\ (= 2)$ or $\dfrac{1}{5} \times 10\ (= 2)$ Either their 180 or their 400 must be correct
	38	A1	Accept 38.0125 (from 500.5)
	Alternative method		
	half of area = 20 large squares	M1	
	(first area =) 7.2 or (second area =) 16 or (third area =) 13.6 **and** (fourth area =) 3.2	M1	
	$\dfrac{20 - \text{their }7.2}{\text{their }16} \times 10 \ (= 8)$ or $\dfrac{\text{their }16 + \text{their }7.2 - 20}{\text{their }16} \times 10 \ (= 2)$	M1dep	oe $\dfrac{12.8}{16} \times 10\ (= 8)$ or $\dfrac{4}{5} \times 10\ (= 8)$ or $\dfrac{3.2}{16} \times 10\ (= 2)$ or $\dfrac{1}{5} \times 10\ (= 2)$ Either their 7.2 or their 16 must be correct
	38	A1	

11b	$1000 \div 100 = 10$ or	M1	oe
	$100 \div 1000 \ (= \frac{1}{10})$ or		34 seen in correct position in table
	$10 \times 40 \div 40 = 10$ or		
	$40 \div (10 \times 40) \ (= \frac{1}{10})$		
	$20 \times 9 \div 10 \ (= 18)$ or	M1	oe
	$20 \times 4 \div 10 \ (= 8)$		
	18, 34 and 8	A1	

12	1.05 seen	B1	oe	
			$9\,000 \div 1.05 \ (= 8571.(\ldots))$	M1
	$9\,000 \div 1.05^3$	M2	their $8571.(\ldots) \div 1.05 \ (= 8163.(\ldots))$	M1
			their $8163.(\ldots) \div 1.05 \ \ (= 7774.(\ldots))$	
	7774.54 or 7774.55 or 7775	A1		
	Alternative method			
	1.05 seen	B1	oe	
	Two trials correctly evaluated of the form $n \times 1.05^3$ with second trial closer to £9000	M1		
	Two trials correctly evaluated of the form $n \times 1.05^3$ with second trial closer to £9000 **and** both values of n in range [7700, 7800]	M1		
	7774.54 or 7774.55 or 7775	A1		

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